APPENDIX G5

AIR QUALITY

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This appendix briefly describes the air quality setting for the San Luis Drainage Feature Re-evaluation and identifies any potential adverse impacts of the alternatives.

G5.1 PHYSICAL ENVIRONMENT

G5.1.1 Climate and Weather

The primary factors affecting local air quality are the locations of air pollutant sources and the amounts of pollutants emitted. However, meteorological and topographical conditions are also important. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

As discussed in Section 2, the study area is located in western San Joaquin Valley and consists primarily of the lands lying within the boundary of the Central Valley Project's San Luis Unit. Climatologically, the summer weather pattern for this area is dominated by a semipermanent, subtropical high pressure area that covers the eastern Pacific and the majority of California. The average rainfall in the study area averages 6 to 8 inches, with 90 percent of the amount falling between November and April.

G5.1.2 Existing Air Quality

As noted above, topography and climate are intimately related to regional air pollution. Long and narrow San Joaquin Valley provides almost no escape for pollution. The valley setting, coupled with high temperatures and inversions that create additional natural barriers to pollution dispersion, causes San Joaquin Valley to face a difficult battle in meeting the State and Federal air quality standards. Additionally, rapid population growth, two major interstate highways, diverse urban and rural sources, geography, and climate also have a negative impact on the regional air quality.

Despite these many challenges emission levels have been decreasing over the past 15 years with the exception of particulate matter less than 10 microns in diameter (PM_{10}) emissions. Based on information presented in California Air Resources Board's *2002 California Almanac of Emissions and Air Quality* (available at http:/www.arb.ca.gov/aqd/aqd.htm), it appears that the downward trend in emission levels is expected to continue. These decreases are predominately due to motor vehicle controls and reductions in evaporative and fugitive emissions.

The conveyance routes to the Delta or Ocean alternatives lead through a number of air districts, air quality attainment status for the alternatives is discussed below.

G5.1.3 Current Sources of Air Pollution – Study Area

The air quality in San Joaquin Valley is not dominated by emissions from one large urban area. Instead, a number of moderately sized urban areas are located throughout the valley. On-road vehicles are the largest contributor to carbon monoxide emissions as well as a large contributor to nitrogen oxide. A large portion of the stationary source reactive organic carbon gas emissions is fugitive emissions from oil and gas production operations. PM_{10} emissions primarily result from paved and unpaved roads, agricultural operations, and waste burning.

G5.2 REGULATORY ENVIRONMENT

G5.2.1 Standards

Both the State and Federal governments have established health-based Ambient Air Quality Standards for the following six air pollutants: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The State of California has also established standards for hydrogen sulfide, sulfates, and visibility-reducing particles. These standards were established to assure an adequate margin of safety to protect the public health.

The California Ambient Air Quality Standards and the National Ambient Air Quality Standards, as well as the associated health effects, are listed in Table G5-1.

G5.2.2 Attainment Status

The study area and the various alternatives impact a number of air quality districts. As such the attainment status of the impacted areas varies. Table G5-2 provides the State and national attainment status of the various districts that appear to be potentially impacted by the San Luis Drainage Feature Re-evaluation alternatives. The impacted areas are considered to be unclassified or in attainment with all other ambient air quality standards (i.e., sulfur oxide, nitrogen oxide, carbon monoxide, etc.).

G5.3 ENVIRONMENTAL CONSEQUENCES

The implementation of the alternatives will impact the air quality in San Joaquin Valley and certain surrounding air districts. The overall air quality impacts due to the emissions generated by the project are classified into construction, operational and odor impacts:

- **Construction Emissions.** Construction-related emissions are generally short term in duration but may still cause adverse air quality impacts. Fine PM_{10} is the pollutant of greatest concern with respect to construction activities. Construction period activities such as demolition, excavating and grading operations, construction vehicle traffic, utility extensions and improvements, and roadway reconstruction will generate exhaust emissions and fugitive particulate matter emissions that would affect local air quality.
- **Operational Emissions.** Operational emissions primarily result from three main source categories:
  - *Indirect sources* – Sources that are not directly related to the project, but result from activities that would not occur but for the project, e.g., motor vehicle trips associated with the project.
  - *Area sources* - Sources that individually emit fairly small quantities of air pollutants, but which cumulatively may represent significant quantities of emissions, e.g., lawn maintenance equipment, painting, etc.

Table G5-1
Applicable Federal and State Ambient Air Quality Standards

Air Pollutant	State Standard (Concentration/ Averaging Time)	Federal Primary Standard (Concentration/ Averaging Time)	Most Relevant Effects
Ozone	0.09 ppm, 1-hr. avg.	0.12 ppm, 1-hr avg. 0.08 ppm, 8-hr avg.	(a) Short-term exposures: pulmonary function decrements and localized lung edema in humans and animals, and risk to public health implied by alterations in pulmonary morphology and host defense in animals (b) Long-term exposures: risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans (c) Vegetation damage (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. 20 ppm, 1-hr avg.	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	(a) Aggravation of angina pectoris and other aspects of coronary heart disease (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease (c) Impairment of central nervous system functions (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.25 ppm, 1-hr avg.	0.053 ppm, annual arithmetic mean	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups (b) Risk to public health implied by pulmonary and extrapulmonary biochemical and cellular changes and pulmonary structural changes (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg. 0.25 ppm, 1-hr. avg.	0.03 ppm, annual arithmetic mean 0.14 ppm, 24-hr avg.	Bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM_{10})	30 $\mu g/m^3$, annual; Geometric mean 50 $\mu g/m^3$, 24-hr avg.	50 $\mu g/m^3$, annual arithmetic mean 150 $\mu g/m^3$, 24-hr avg.	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease (b) Excess seasonal declines in pulmonary function, especially in children
Suspended Particulate Matter ($PM_{2.5}$)	No separate standard	15g/m^3, annual arithmetic mean 65g/m^3, 24-hr avg.	Increase in respiratory disease, lung damage, cancer, premature death, reduced visibility, and surface soiling
Sulfates	25 $\mu g/m^3$, 24-hr avg.	No Federal standard	(a) Decrease in ventilatory function (b) Aggravation of asthmatic symptoms (c) Aggravation of cardiopulmonary disease (d) Vegetation damage (e) Degradation of visibility (f) Property damage
Lead	1.5 $\mu g/m^3$, 30-day avg.	1.5 $\mu g/m^3$, calendar quarter	(a) Increased body burden (b) Impairment of blood formation and nerve conduction
Hydrogen Sulfide	0.03 ppm, 1-hr. avg.	No Federal standard	Nuisance odor (rotten egg smell), headache, and breathing difficulties in higher concentrations
Visibility-Reducing Particles	In sufficient amount to reduce the visual range to less than 10 miles at relative humidity less than 70 percent, 8-hour avg. (10am - 6pm)	No Federal standard	Visibility impairment on days when relative humidity is less than 70 percent

Sources: South Coast Air Quality Management District's *1997 Air Quality Management Plan* available at http://www.aqmd.gov/aqmp/97aqmp/m-exec.html; California Air Resources Board's *Air Quality Standards* page available at http://www.arb.ca.gov/aqs/aaqs2.pdf.

Table G5-2
State and National Attainment Status Classifications

Air Basin	Air District	Alternative Impacting Air Quality	State Ozone Attainment Status (1-hour standard)	State PM_{10} Attainment Status	National Ozone Attainment Status (1-hour standard)	National PM_{10} Attainment Status
San Joaquin Valley	San Joaquin Valley	All	Nonattainment	Nonattainment	Nonattainment	Nonattainment
San Francisco Bay	San Francisco Bay Area	Delta	Nonattainment	Nonattainment	Nonattainment	Unclassified
South Central Coast	San Luis Obispo	Ocean	Nonattainment	Nonattainment	Unclassified/ Attainment	Unclassified

Source: California Air Resources Board's *2001 State and National Area Designation Maps of California* available at http://www.arb.ca.gov/desig/adm/adm.htm.

- *Point sources* – Certain projects also may generate stationary, or "point," source emissions. Although most area sources discussed above are usually stationary, the terms stationary or point source usually refer to equipment or devices operating at industrial and commercial facilities, e.g. power plants.

- **Odor Emissions.** The objectives of odor control for the San Luis Drainage Feature Re-evaluation are to meet the State standards of 0.03 ppm or less at the nearest receptors based on a 1-hour averaging period. Meeting this objective will assure that the facility does not cause an offsite odor nuisance.

A description of the construction, operational, and odor impacts specific to each alternative is presented below. It should be noted that although the impacts discussed below appear to be qualitatively insignificant, the alternatives have the potential for significant cumulative impacts, which will be addressed in the full Environmental Impact Statement (EIS) in 2003.

G5.3.1 No Action Alternative

The No Action Alternative evaluates the effects of not conveying drainwater out of the basin for disposal, thus providing a benchmark against which action alternatives may be evaluated. No new construction will occur as part of the No Action Alternative. The only operational emissions will result from maintenance of existing facilities.

G5.3.2 Ocean Disposal Alternative

G5.3.2.1 Construction Emissions

The construction emissions of the Ocean Disposal Alternative route will be concentrated in southern San Joaquin Valley. Construction emissions are likely to be higher in the southern valley area as a result of having to transverse through and over the Coast Ranges as well as the expected construction of a power plant. This alternative will result in the installation of the most miles of pipeline and pumping stations of the four action alternatives. The main pollutants of concern would be fugitive dust emissions and exhaust emissions from construction equipment.

G5.3.2.2 Operational Emissions

Indirect emissions would be expected from employee trips to and from the pumping plants and the new power plant. With ten potential pumping plants located through out the region, emissions will impact from Los Banos south through San Joaquin Valley and west through San Luis Obispo County to the ocean. Because the pumping stations are located throughout the region it could require long employee trips, increasing emissions. The main pollutants of concern from these indirect sources would be carbon monoxide and nitrogen oxide emissions from vehicular trip and possibly PM_{10} emissions if the trips required travel over unpaved roads.

General lawn and building maintenance at the six pumping plant sites and power plant would make up the area source operational emission contribution. The products of combustion would be expected from any lawn maintenance, which would be required on the pumping plant and power plant sites. Additionally, volatile organic compounds and small quantities of hazardous air pollutants might be expected from solvents and paints used for the building maintenance.

The new power plant and increased utilization from nearby power producers would generate the point source emissions. The products of combustion would be the main pollutants of concern.

G5.3.2.3 Odor Control

Odor control should not be of concern for the Ocean Disposal Alternative because the drainwater contains nitrates, which will prevent the generation of sulfide during conveyance. When present, nitrates are used by microbes as an oxygen source rather than sulfate, so sulfide is not generated. Nitrate addition (bioxide product) is a common and effective method of sulfide control.

G5.3.2.4 Permit/Regulatory Impacts

As shown in Table G5-2, the Ocean Disposal Alternative will impact both San Joaquin Valley Air District and San Luis Obispo Air District. Each district operates under its own set of air quality regulations. A quantitative emission analysis will be performed in the full EIS in 2003. The anticipated emissions will be compared to the appropriate thresholds to determine the permitting requirements.

The new power plant associated with this alternative may require limitations associated with a New Source Performance Standard, or Maximum Achievable Control Technology requirements. Additionally, if the project construction requires any building demolition, compliance with 40 Code of Federal Regulations (CFR) 61 Subpart M (National Emission Standard for Asbestos) may be required if the building has any asbestos-containing materials.

G5.3.3 Delta Disposal Alternatives – Chipps Island or Carquinez Strait

G5.3.3.1 Construction Emissions

Construction emissions for the Delta Disposal Alternatives will be concentrated in northern San Joaquin Valley, as the route conveys the drainwater north through San Joaquin Valley into Contra Costa County of the San Francisco Bay Area Air District to the Delta. Both Delta Disposal Alternatives will have similar construction emissions with the Carquinez Strait alternative having slightly more because of the additional pipeline needed to reach the strait. Both options will consist of the construction of selenium treatment facilities. The emissions from construction of the treatment facilities are anticipated to be higher than those generated from the installation of the pipelines.

G5.3.3.2 Operational Emissions

Unlike the Ocean Disposal Alternative, only two pumping stations are under consideration for the Delta Disposal Alternatives, requiring less employee trips and resulting in lower indirect emissions. The main pollutants of concern from these indirect sources would be carbon monoxide and nitrogen oxide emissions from vehicular trips and possibly PM_{10} emissions if the trips required travel over unpaved roads.

General lawn and building maintenance area source emission will be considerably lower due to the fact that only two pumping plant sites will need maintenance. The products of combustion would be expected from any lawn maintenance, which would be required on the pumping plant sites. Additionally, volatile organic compounds and small quantities of hazardous air pollutants might be expected from solvents and paints used for the building maintenance.

Finally, energy consumption for the conveyance of the water and the operation of the pumping plants would be point source contributions. It is assumed that the energy used for this alternative will increase the local baseline demand and will require additional generation capacity, either at an existing facility or a new project generation facility. The products of combustion will be the main pollutants of concern.

G5.3.3.3 Odor Control

Odor control is not a concern for the conveyance of the fully treated flow for the Delta Disposal Alternatives. Although nitrates have been removed from the treated flow, organics have also been removed, so no sulfide generation is expected to occur during conveyance.

G5.3.3.4 Permit/Regulatory Impacts

As shown in Table G5-2, the Delta Disposal Alternatives will impact both San Joaquin Valley Air District and the San Francisco Bay Area Air District. Each district operates under its own set of air quality regulations. A quantitative emission analysis will be performed in the full EIS in 2003. The anticipated emissions will be compared to the appropriate thresholds to determine the permitting requirements. Based on current information it does not appear that any alternative would require compliance with any New Source Performance Standards, or Maximum Achievable Control Technology requirements. However, if the project construction requires any building demolition, compliance with 40 CFR 61 Subpart M (National Emission Standard for Asbestos) may be required if the building has any asbestos containing materials.

G5.3.4 In-Valley Disposal Alternative

G5.3.4.1 Construction Emissions

Construction activities for the In-Valley Disposal Alternative will occur mostly in central San Joaquin Valley. Emissions associated with the construction of the large evaporation ponds for the selenium treatment facilities and reverse osmosis plant(s) as well as the subsequent landfilling requirements of this alternative will likely outweigh the other action alternatives' emissions associated with the construction of pipelines and pumping facilities.

G5.3.4.2 Operational Emissions

Utilization of the evaporation ponds is not anticipated to cause any microclimate change to the region. The region already has a foggy season, which lasts from November to February.

Indirect emissions would be expected from employee trips to and from the treatment facilities, evaporation ponds, mitigation facilities, and reverse osmosis plant. The main pollutants of concern from these indirect sources would be carbon monoxide and nitrogen oxide emissions from vehicular trip and possibly PM_{10} emissions if the trips required travel over unpaved roads.

General lawn and building maintenance at the treatment facilities would make up the area source emission contribution. The products of combustion would be expected from any lawn maintenance, which would be required on the pumping plant sites. Additionally, volatile organic compounds and small quantities of hazardous air pollutants might be expected from solvents and paints used for the building maintenance.

Finally, energy consumption for the conveyance of the water and the operation of the pumping plants would be point source contributions. It is assumed that the energy used for this alternative will increase the local baseline demand and will require additional generation capacity, either at an existing facility or a new project generation facility. The products of combustion will be the main pollutants of concern.

G5.3.4.3 Odor Control

Odor control is only of concern during the treatment of the drainwater at processes where sulfide generation or release can occur. Sulfide generation will occur in processes where the nitrates have been removed but some organics remain. Sulfide can also be formed during solids processing operations.

For the high-rate biological treatment option (see Figure G5-1) the liquid treatment processes of concern for sulfide formation and release include the final cell of the Kaldnes basin, the deep bed denitrification filters, and the post aeration basins. The solids handling processes of concern include the backwash water holding tanks, thickener, and belt filter presses. Sulfide may be formed in the final cell of the Kaldnes basin after nitrates have been removed through denitrification. The addition of ferric chloride to the final cell will treat the sulfide. A ferric chloride feed line would also be installed ahead of the deep bed filters to supplement the dosage, if needed, thus preventing hydrogen sulfide emissions at both the filters and the post aeration. The ferric addition at the deep bed filters will also control sulfide emissions through the backwash water holding tanks. Some additional sulfide may be formed during thickening, so feed lines will be installed to add ferric chloride to the thickeners and ahead of the belt filter presses to control hydrogen sulfide emissions during pressing operations. A single 6,000-gallon storage tank will provide sufficient capacity and allow receiving bulk shipments of ferric chloride chemical from a tank truck.

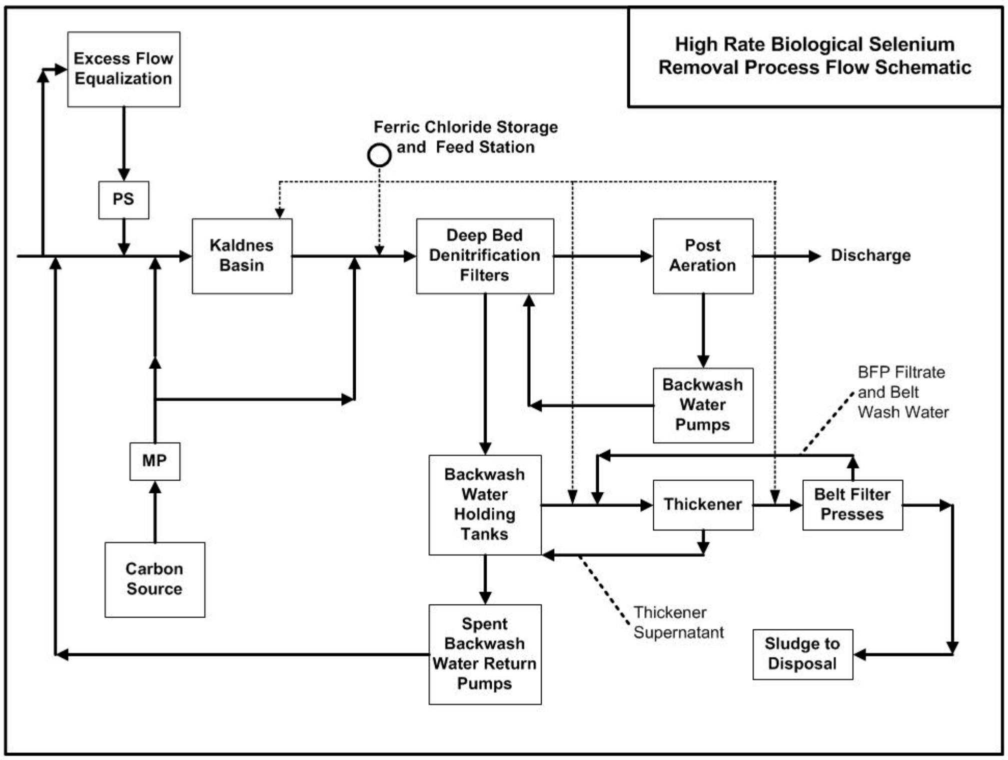

Figure G5-1 High-Rate Biological Selenium Removal Process Flow Schematic

For the lagoon biological treatment option (see Figure G5-2) the processes of concern for sulfide generation and release are the final anoxic pond and the aerated lagoon. Sulfide may be formed in the final pond after nitrates have been removed. The anoxic ponds will be covered so no emissions will occur from the ponds. However, the sulfide will remain in solution and be released at the aerated lagoon. The addition of ferric chloride to the final anoxic pond will treat sulfide and prevent odor at the aerated lagoon, which is expected to meet the present standards. If a higher degree of odor control is desired in the future, floating covers and vapor-phase treatment could be added at the aerated lagoon. A single 6,000-gallon storage tank will be installed to allow receiving bulk shipments of ferric chloride chemical from a tank truck.

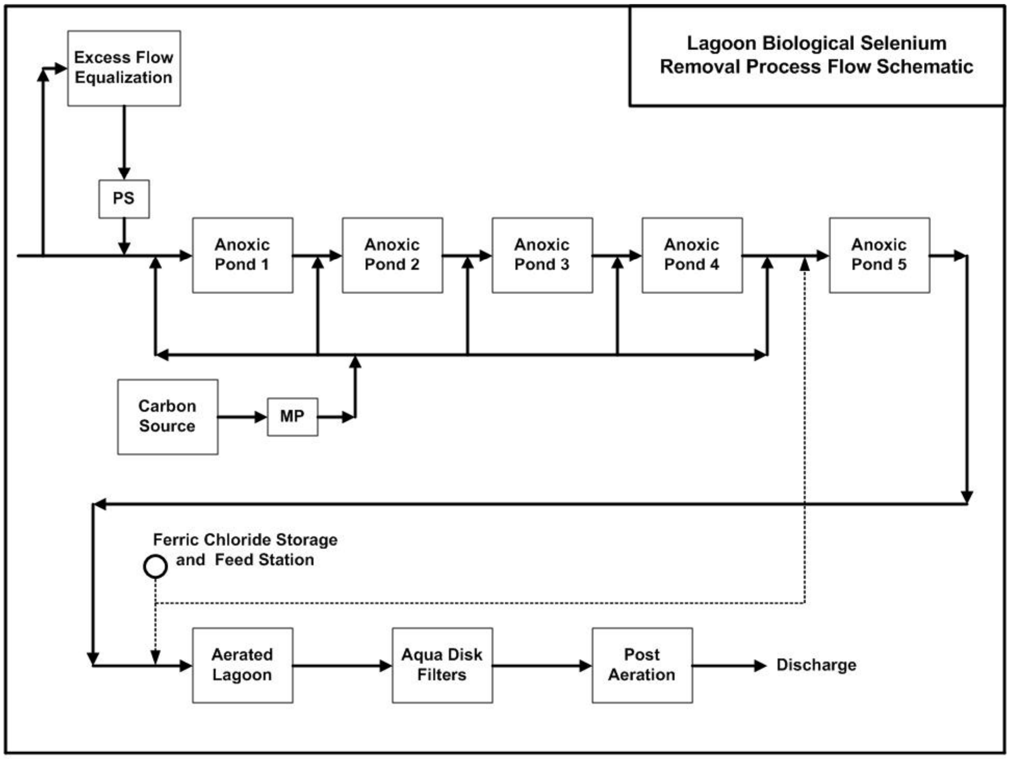

Figure G5-2 Lagoon Biological Selenium Removal Process Flow Schematic

The anoxic lagoons will gradually accumulate solids. To remove solids, it is assumed that an individual lagoon will be taken out of service and the liquid pumped to another lagoon. The solids would then be allowed to air dry and would be removed using bobcats or front-end loaders. The solids material is expected to be relatively inert, but some odors may be emitted during removal. Operating techniques that can be used to minimize odor include limiting the amount surface area that is exposed during solids removal, timing the solids removal to periods of higher wind when dispersion is best, and covering the open face overnight to avoid odors.

G5.3.4.4 Permit/Regulatory Impacts

As shown in Table G5-2, the In-Valley Disposal Alternative will impact San Joaquin Valley Air District, which operates under its own set of air quality regulations. A quantitative emission analysis will be performed in the full EIS in 2003. The anticipated emissions will be compared to the appropriate thresholds to determine the permitting requirements. Based on current information it does not appear that any alternative would require compliance with any New Source Performance Standards, or Maximum Achievable Control Technology requirements. However, if the project construction requires any building demolition, compliance with 40 CFR 61 Subpart M (National Emission Standard for Asbestos) may be required if the building has any asbestos containing materials.